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Chee

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(54) **LAUNCHING APPARATUS AND ASSEMBLY**

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F41B 3/02 (2006.01)

(52) **U.S. Cl.** **124/20.3**; 124/20.1; 473/578

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124/17, 20.1, 20.2, 20.3, 23.1; 473/578
See application file for complete search history.

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(57) **ABSTRACT**

A launching apparatus for shooting a series of bolts in rapid-fire succession. The apparatus has an arcuate frame which is arranged along a longitudinal medial section with a transversely aligned upper section and a transversely aligned lower section. The midpoint of the arcuate frame has a grip portion for holding onto the launching apparatus. The frame also has an elastic launching band which is held tightly between an upper connector and a lower connector. A forearm brace extends perpendicular to the arcuate frame. The arcuate frame is held within a launching plane and the forearm being secured to the longitudinal medial section and aligned parallel to the user's forearm. The forearm brace resists an overturning moment applied from the elastic band about the longitudinal medial section of the arcuate frame. The brace keeps the arcuate frame in its launching plane. The bolt is configured for rapid-fire launch, and is arranged as a cylindrical shaft. The shaft has a fore end with a head portion, a first firing hook and a second firing hook arranged equidistant from one another and spaced circumferentially around the cylindrical shaft. The bolt also has at the aft end, a first fin which is radially extending from the shaft, and a second fin radially extending from the shaft. A third fin also radially extends from the cylindrical shaft; the first fin, second fin and third fins are spaced circumferentially equidistant apart from one another about the shaft to provide aerodynamic alignment during flight.

19 Claims, 6 Drawing Sheets

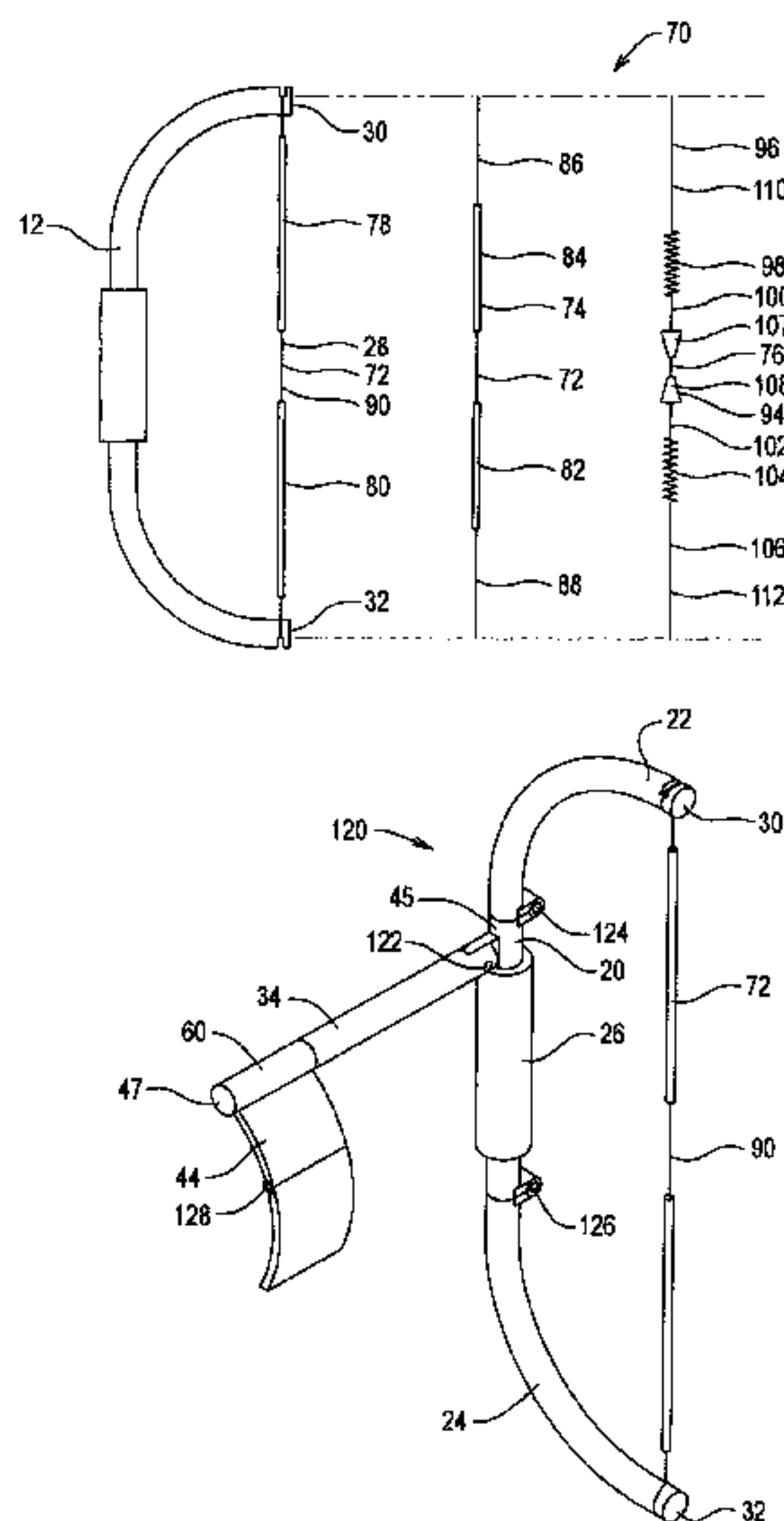


FIG. 2

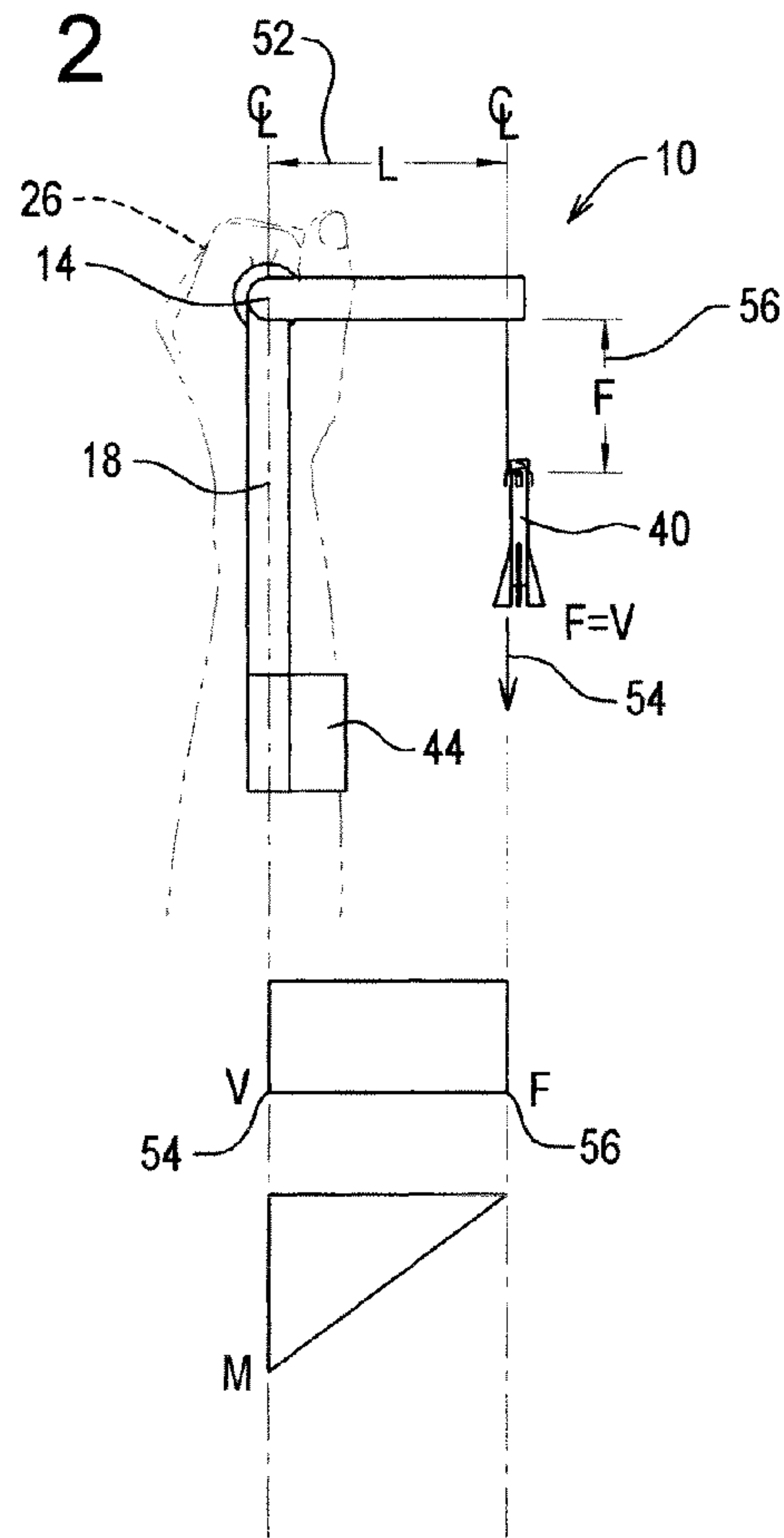
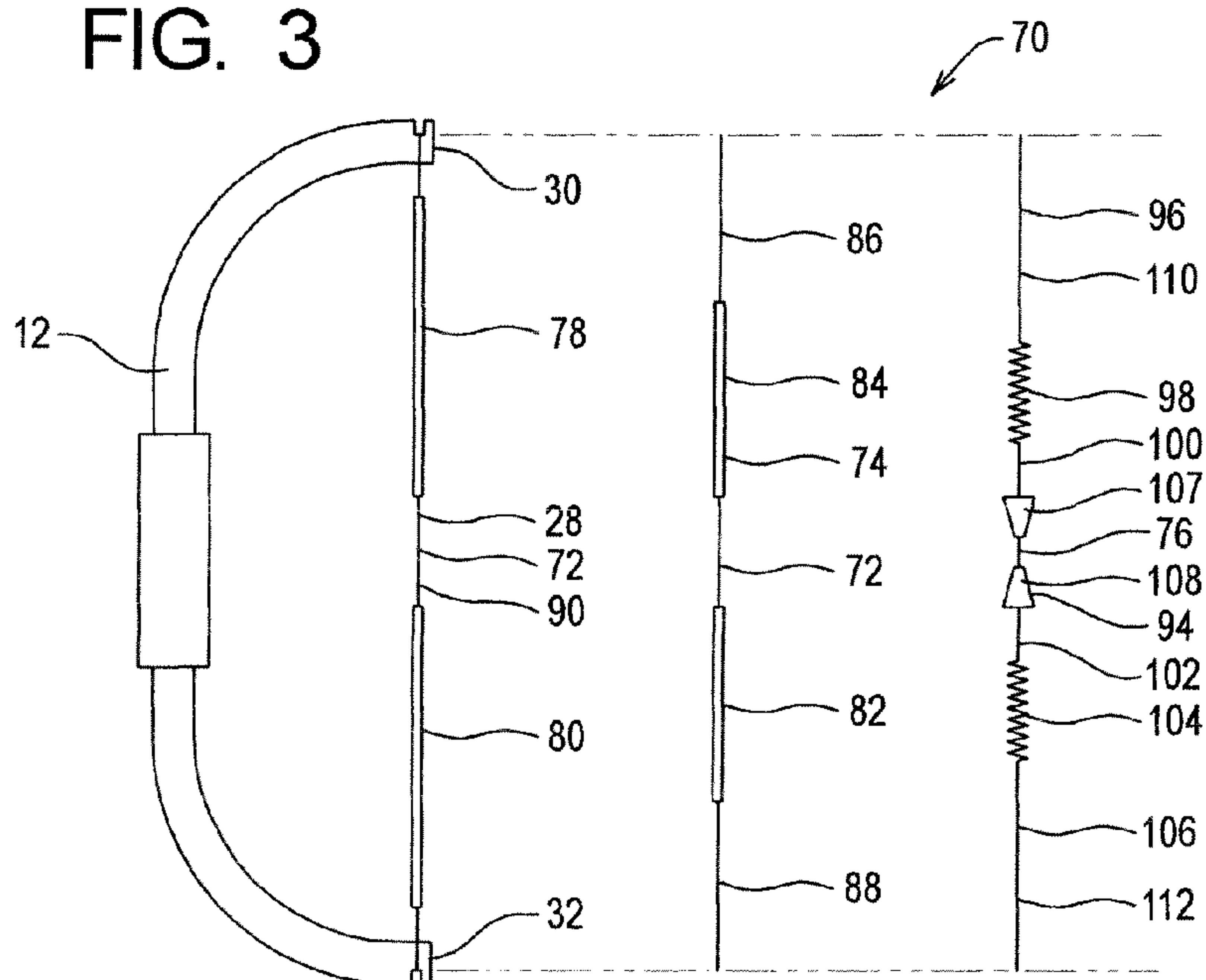


FIG. 3



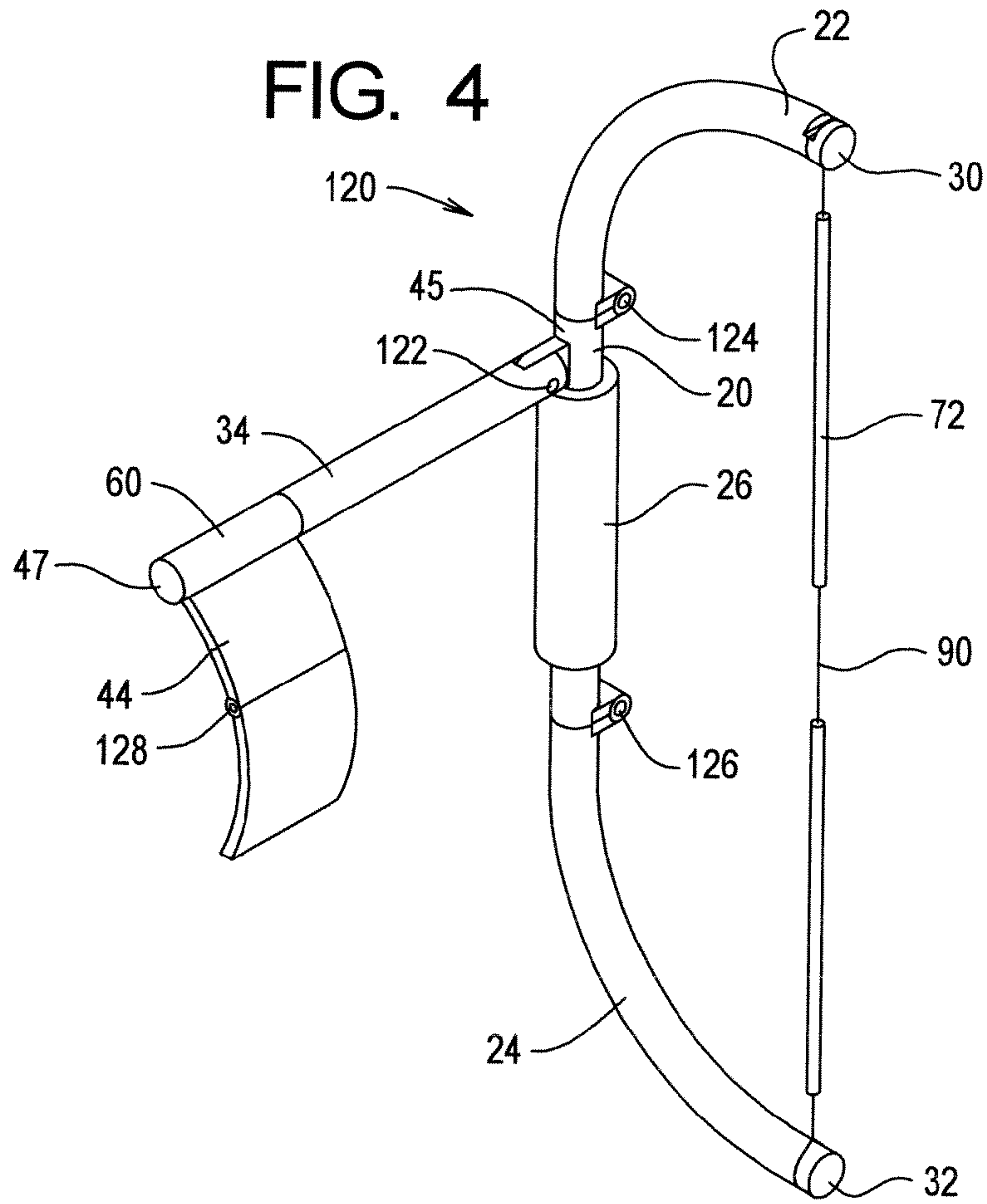


FIG. 5

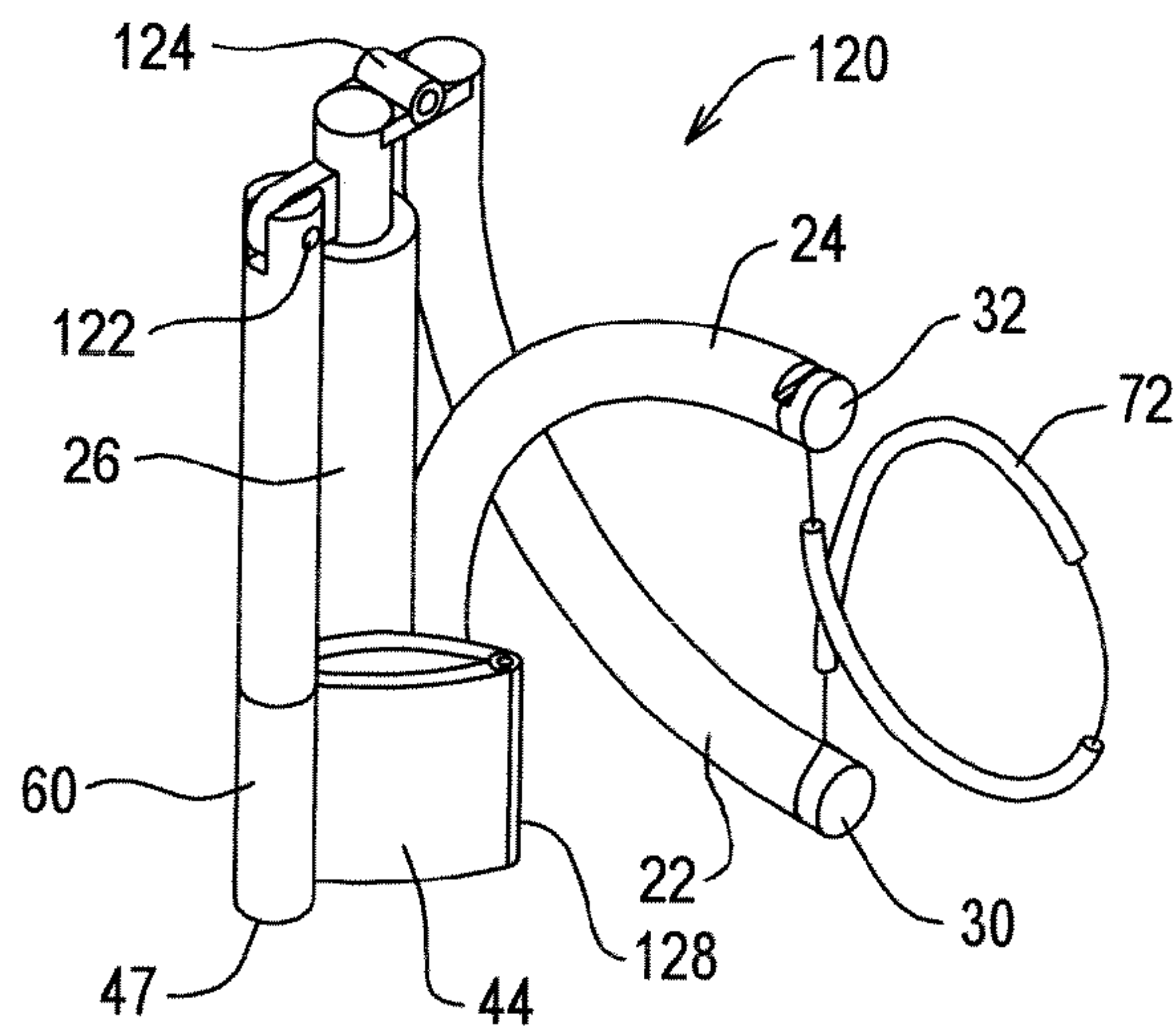


FIG. 6

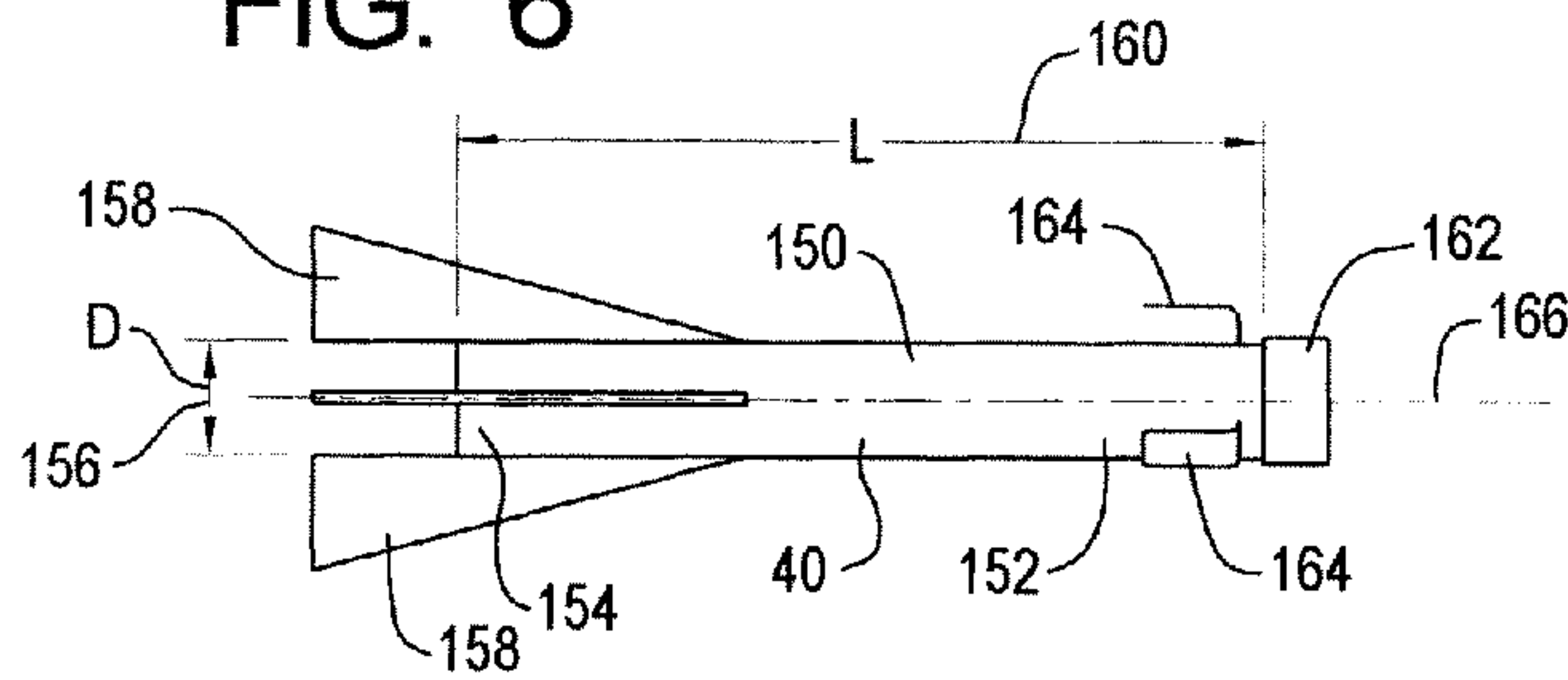


FIG. 7

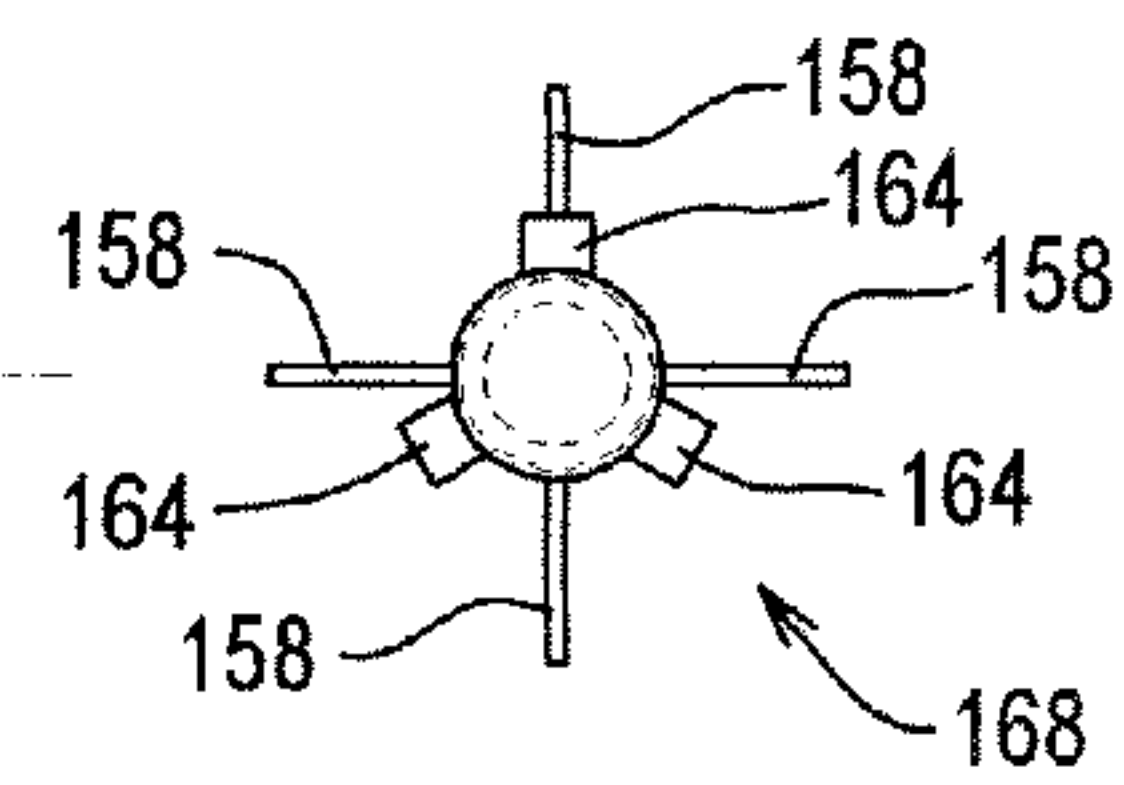


FIG. 8

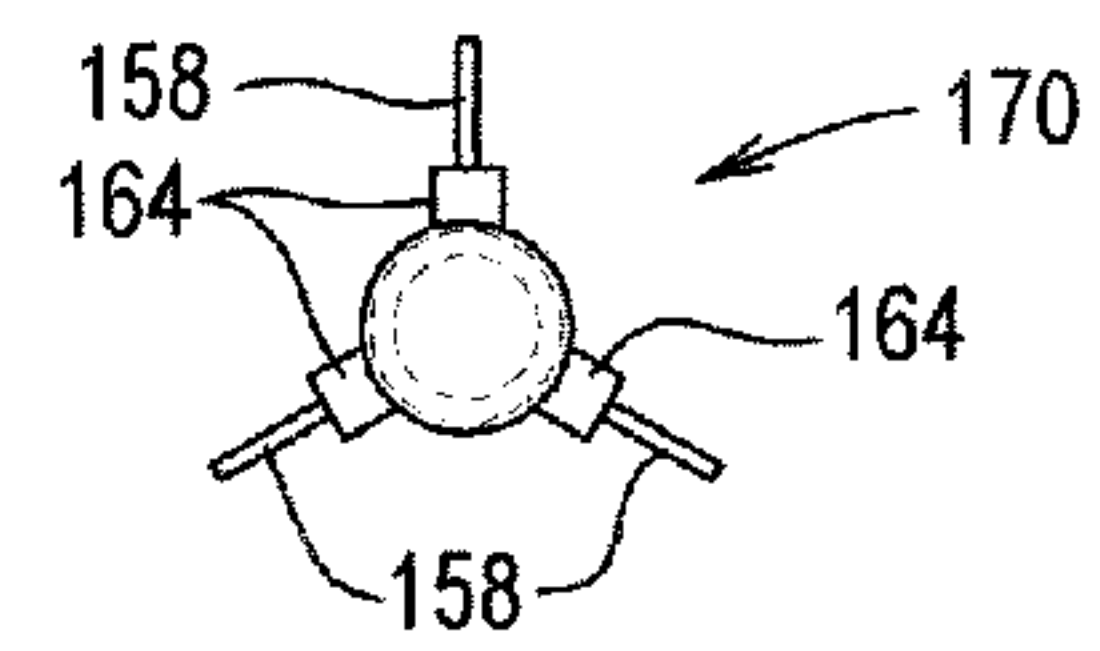


FIG. 9

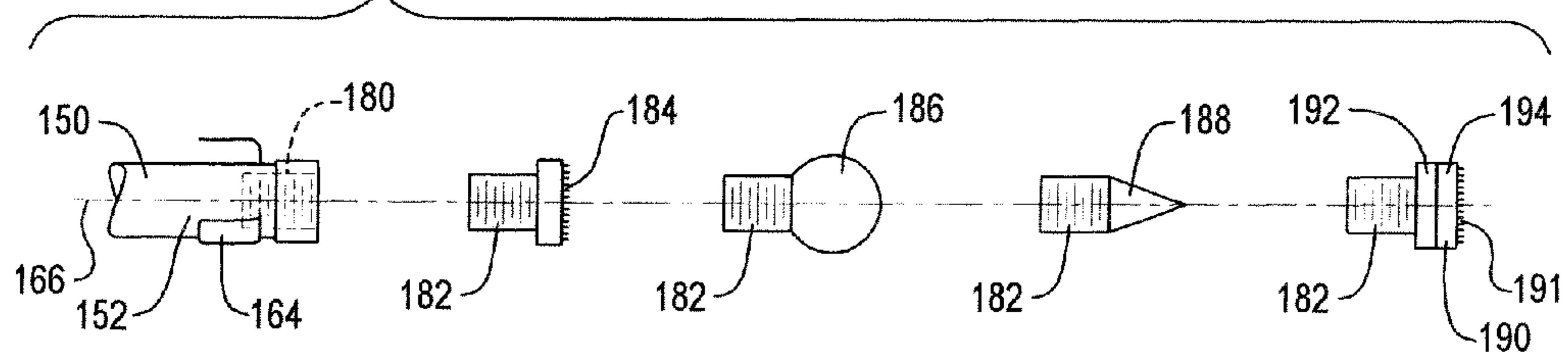


FIG. 10

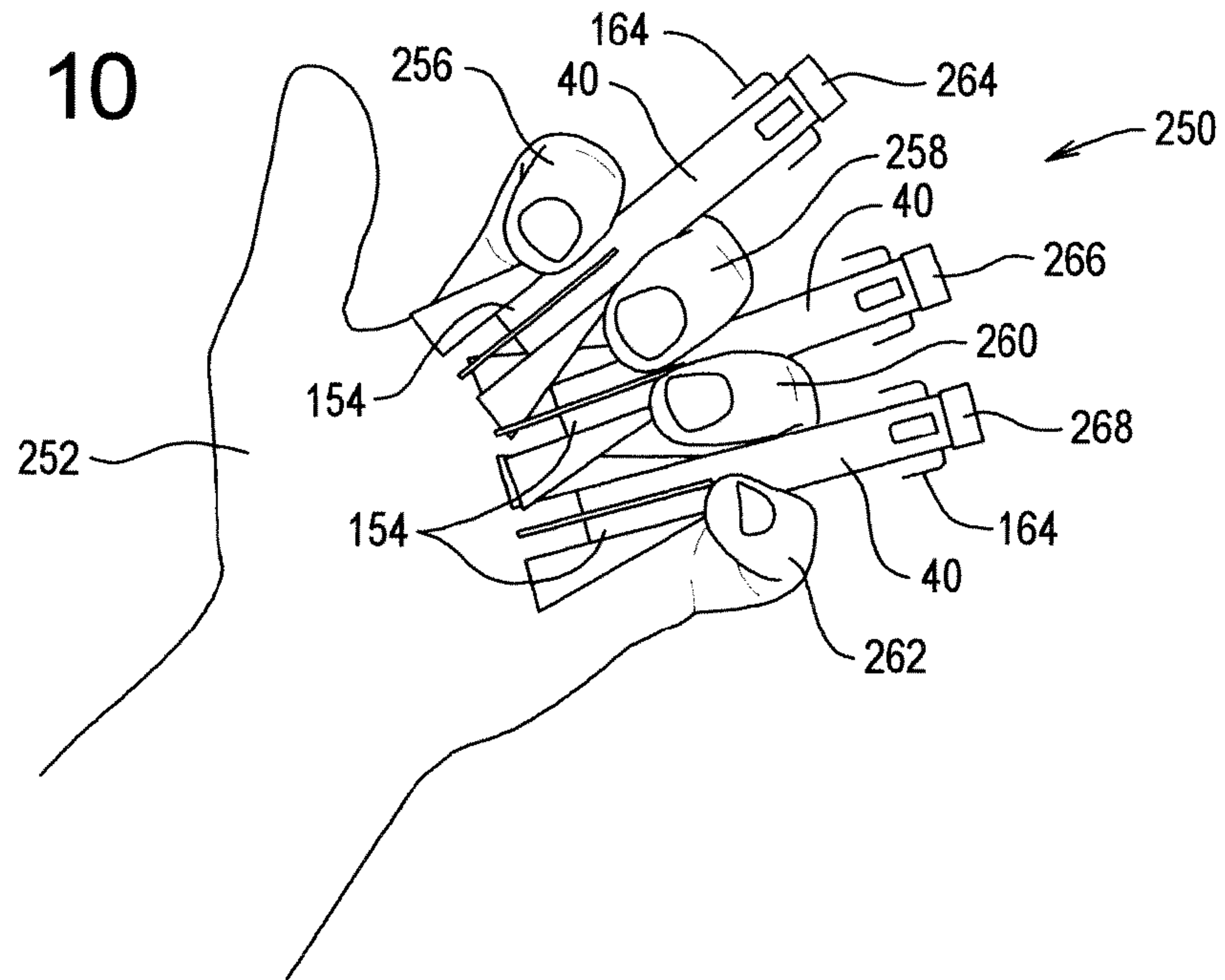


FIG. 11

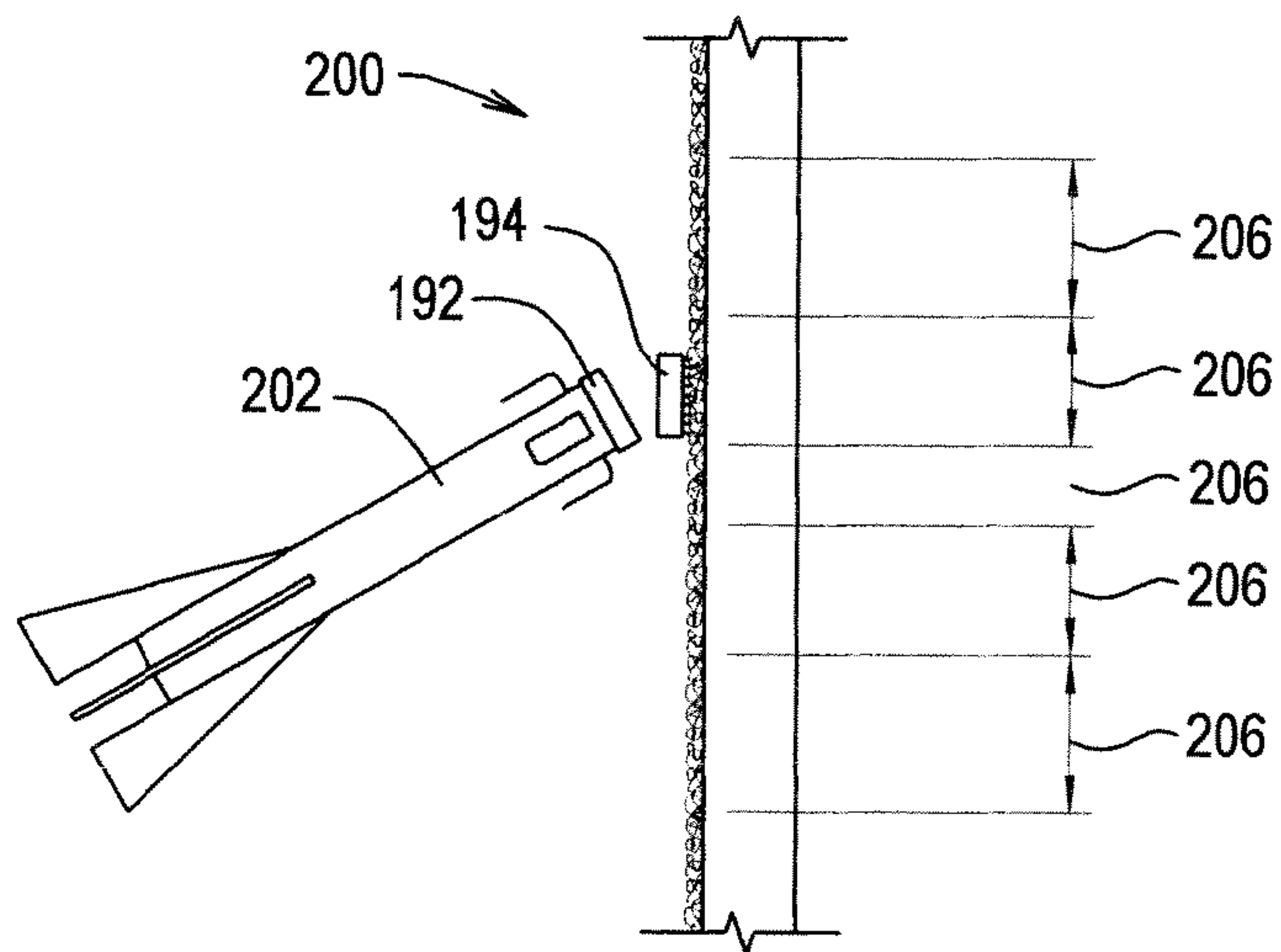
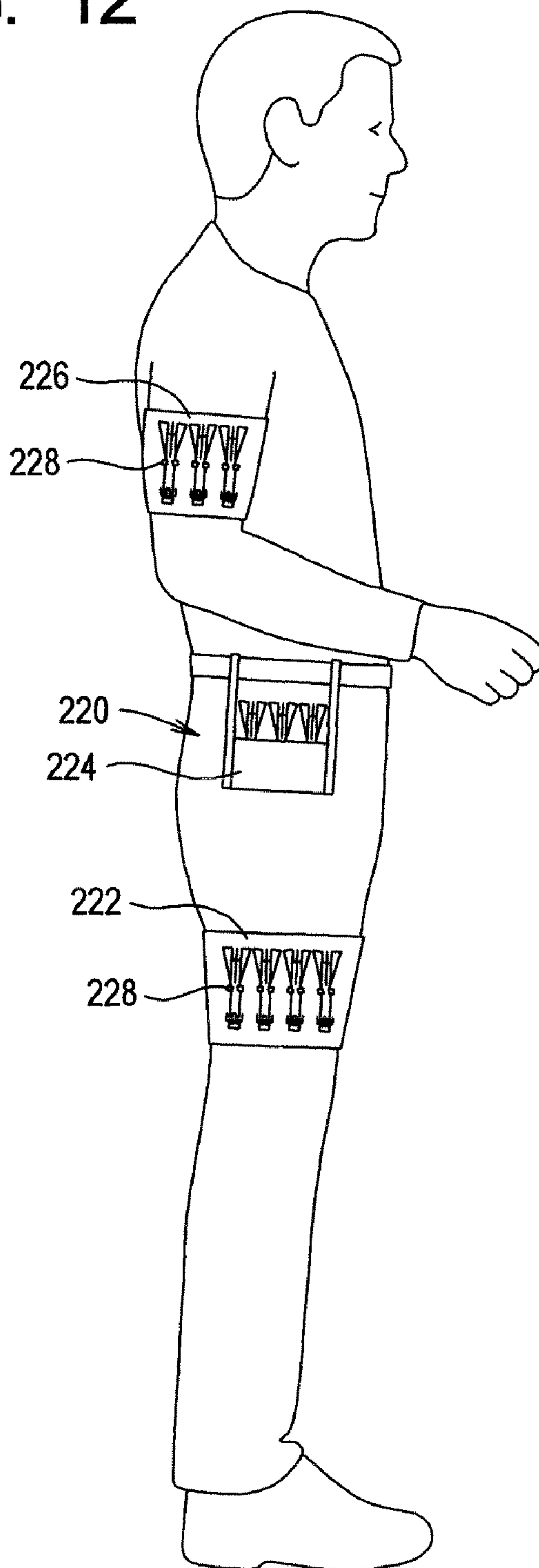


FIG. 12



LAUNCHING APPARATUS AND ASSEMBLY

BACKGROUND

U.S. Pat. No. 5,632,262 (Hanson) discloses a compound slingshot, using a shortened pair of resilient bow limbs, which are horizontally mounted to a rigid center body. This center rigid body is essentially the rigid support shaft of the compound slingshot. It is divided into an upper section and a lower section. The upper section has the barrel or hole which the shaft exits through. Also, the bow limbs are rigidly connected to the upper section of the support shaft providing the desired rotational resistance. The bottom or lower section of the shaft body is the handgrip and a forearm brace. This compound is operated in an upright position where the bow limbs extend horizontally parallel with the plane of the earth. The firing mechanism includes a string which is attached to the cantilevered ends of the bow limbs. Referring to column three at line 63, a drawstring is essential attached at one end to the left compound pulley where it then passes through the left resilient bow limb and extends laterally down the horizontal length of the compound slingshot after passing underneath the drawstring retainer rod, which is essentially attached to the lateral surface of the body. The drawstring then passes through the right resilient bow limb when it engages the right compound pulley and encircles the pulley outside edge in 180 degree fashion to a point on the edge of the right compound pulley. The drawstring then extends back down the horizontal length of the body where it engages the inward edge of the left compound pulley. It again encircles the left pulley in 180 degree fashion passing underneath the drawstring retainer rod before passing through the right resilient bow limb, finally being attached to the right compound pulley. An ammunition pouch is mounted centrally between the two sides of the double separated string portion, which creates a pouch for the ammunition to be loaded within.

In the summary of the invention section, col. 2 around line 17, "the primary objective . . . is to provide a method of increasing a projectile velocity from a handheld and forearm braced hunting or target shooting slingshot." Furthermore at line 36, "this configuration is compact . . . and combines . . . a compound bow with . . . a crossbow. Additionally, the present invention is designed to use round, steel shot as ammunition."

U.S. Pat. No. 5,619,978 (Flournoy) discloses a slingshot which has as rigid frame and a projectile launching area secured to a forearm support. The projecting launching area is made of an elongated cylindrical shaft in the current embodiment which is attached at the forward portion to a fork made of tubes. A cross member is secured to the rear end of the cylindrical shaft and includes a terminal end which has a handgrip. The forearm support member is asymmetrically offset from the centerline of the cylindrical shaft providing for example the left hand to act as the supporting forearm member and the right hand to act as the tensioning force keeping the projectile attached to the string reasonably in the center of the fork to provide for launching.

In the summary of the invention section, col. 1 around line 32, "it is a principle object of the invention to provide a slingshot which may be aimed in a manner similar to that of a rifle or shotgun by sighting directly along the longitudinal axis of one of its members so the projectiles may be thrown there from with great velocity, accuracy and ease." Furthermore at line 52, "briefly . . . this invention achieves the intended objects . . . including a first elongated member with a forward end and a rearward end. A fork adapted for attachment of a pair of elastomeric tubes secured to the forward

end . . . a crossmember secured to the rearward end of the first elongated member has a terminal and remote there from and defining a handgrip."

U.S. Pat. No. 5,501,207 (Black) discloses an arm brace slingshot formed by a U-shaped member having elongated legs adapted to extend along opposite sides of a forearm with the bight portion disposed forwardly of the user's hand when gripping a handle transversely extending between the legs. Inverted L-shaped posts are mounted on the respective forward and end portions of each leg adjacent to the bight portion have their foot portions projecting generally rearward and parallel to the elongated legs and angled inward relative to the longitudinal axis of the frame legs for better sighting alignment of the missile pocket of a sling connected with the post foot portions which transfer the strain of stretching the sling to the forearm of the user.

In the background of the invention section, col. 1 around line 3, "this invention relates to slingshots and more particularly to a hand and wrist strain releasing slingshot." Furthermore in the summary of the invention section, column 2 around line 27, "the principle objects of this invention are: to provide a balanced unit formed by parallel frame rods joined at one end by a U-shaped bite portion; a handgrip adjacent to the bite portion; arm saddle strap securing the rods to the user's forearm which counters the stress or pull of a tubular sling and provides stability for true and accurate shooting in which the sling is attached . . ."

U.S. Pat. No. 4,877,007 (Olson) discloses a sling bow for launching arrows, which has a handle connected to a pair of sling posts with a twin sling attached. The sling arms are made of elastic material which can be stretched and released to prepare an arrow between sling posts. A movable arrow rest connected between the sling arms near the sling posts supports the forward end of the arrow when the sling is stretched.

In the disclosure of the invention section, col. 1 around line 51, "in the sling bow of this invention the arrow rest extends between and is supported by the arms of the sling. When the sling is stretched the rest automatically rises to a position where it can support a forward region of an arrow. When the sling is released and relaxes, the rest drops out of the way of the arrow so as not to interfere with its flight."

U.S. Pat. No. 4,250,861 (Ellenburg) discloses a foldable wrist brace slingshot which has a yoke, handgrip and elastic members connected to the yoke. A wrist brace is connected and detachable to the handgrip at the base of the grip. The wrist brace has longitudinal support members which angle obtusely from the handgrip which make for extra room to receive the wrist between the members. The wrist brace can be folded down and locked into place over a cam surface which has grooves allowing for the longitudinal members of the wrist brace to spread slightly and pass over the cam surfaces to lock the wrist brace into place for the shooting position.

In the summary of the invention section, col. 1 around line 46, "these and other objects of the invention are obtained by a folding slingshot comprising a yoke having a handgrip, elastic members connected to the yoke, wrist brace means frictionally, detachably and pivotally mounted to the handgrip near the base, the wrist brace comprising a pair of longitudinally aligned members diverging rearwardly from the handgrip spaced apart to receive the wrist between an end member integral row with said longitudinal members engageable with the user's wrist . . ."

U.S. Pat. No. 3,967,823 (Yount) discloses a target and separable target markers for a dart, where the dart game provides the ability to hit or impact a target with a plurality of separate darts which each have a target marker separately

mounted on them. The targets and target markers each cooperatively adapt to retain the target marker onto the target at the point of impact while the dart separates after hitting the target.

In col. 1 around line 7, “the principle objects of the present invention are: to provide a dart game and dart having a separable target marker to permit marking a hit or impact point on the target; . . .”

U.S. Pat. No. 3,918,427 (Turner) discloses a slingshot with the fork arranged forward of the handgrip which increases the distance through which the elastic string or member of the slingshot can be drawn back increasing the force and propelling missiles through the fork of the slingshot. Missiles or bolts in this particular concept having a hook at the front end for engaging the elastic string and have enlarged flattened tail fins with finger holes in them which act as the triggering mechanism. The tailfin is aerodynamically tapered with fins of some sort to stabilize the bolt in flight. Sighting along the shaft of the bolt significantly increases the accuracy of the slingshot and makes it possible to reliably hit game at respectable hunting ranges.

In the summary of the invention section around line 12, “this invention provides a novel slingshot and a novel slingshot missile capable of killing small and large game. The slingshot has a fork supported in a position forward of the handgrip to increase the distance through which the elastic of the slingshot can be drawn back, increasing the force applied to the missile. The missile is a bolt having a hook at its front end for engaging the elastic means having an enlarged flattened tailfin with finger holes therein. A broadhead can be attached to the front end of the bolt and shot from the slingshot with sufficient velocity to kill small or large game at reasonable hunting regions. . . . “the slingshot has an arm which is attached to the top of the handgrip and extends forwardly to the fork and rearwardly to a forearm brace. Accuracy is provided by cocking the fork at an angle to the axis of the arm at a central line perpendicular to the line between the attachment points of the elastic to the fork as directed toward the eyes of the user . . .”

U.S. Pat. No. 3,875,923 (Horel) discloses a slingshot with an arm brace and range indicating shooting distances. This is again a standard slingshot with an elongated elastic member and the slingshot has an elongated arm to provide for large projectile forces.

U.S. Pat. No. 3,865,094 (Sweeney) discloses an arm braced and stabilized slingshot which has an upright handle and a fork for attachment of elastic bands, a single rod which is releasably engaged to the upright and adapted to extend along the lower side of the user’s forearm, and can be slidably attached and engaged to the user’s forearm transferring forces from the wrist of the user to the upper forearm.

Referring to col. 1 around line 15, “a principle object of the present invention is to provide a slingshot of simple construction, easy to assemble and disassemble, easy to operate and which is effective in providing steadiness, accuracy, and comfort at great range.

U.S. Pat. No. 3,834,368 (Geiger) discloses an archery bow with a slingshot combination which has a construction with sections cantilevered to define a projectile opening between the two cantilevered sections. The opening allows unrestricted vision where the user can employ a binocular sighting to follow the flight of the arrows. The opening allows the projectile to have stabilizer sections which will not be impeded by standard bow shaft construction. The bow allows the bow string to move in a plane offset from the user’s forearm and prevents slapping, scraping and injury. A slingshot projectile propelling device is attached to the cantilevered sections. This is in addition to the bow arms. The

slingshot elastic member extends transversely between the cantilevered sections, thus having a string distance limited to the opening. The elastic string member for the slingshot is not elongated and tensioned as your composite bow sling is provided, which has the medial U-shaped shaft of the bow allowing for increased projectile force.

As seen in col. 1 around line 4, “the invention is to provide a bow and arrow that does not slide the arrow along or in close proximity of the bow as the arrow is discharged . . .”. Further at line 11, “also the arrow is so constructed to set the straddle of the bow string to a point that is forward past the arrow’s center of gravity. The arrow is constructed with rigid fingers which also double as fins.” Further at line 30, “a third object of this invention is to provide the choice of having a bow and arrow combined with a slingshot so either one can be used at will or either one used alone. The elastic string of the slingshot can also be used to launch toy gliders, airplanes etc.”

U.S. Pat. No. 3,749,075 (Saunders) discloses a slingshot with connection for a projectile propelling an elastic member. This is a handheld slingshot with reversed hooked forearms for avoiding extreme flexure of the slingshot fork arms by sweeping the fork arms towards the rear.

As seen in col. 1 around line 7, “it is a principle feature of the invention that it obviates the destructive and abrasive wear suffered by the elastic tubes upon release and subsequent fold over during recoil of the tubes after distention and release of the elastic tubes in use of the slingshot.”

U.S. Pat. No. 2,807,254 (Stribling) discloses a slingshot which is designed to be used with the user’s hand gripping the handle placed in a horizontal arrangement underneath the U-shaped frame which has hooks which are curved upwardly, extending rearward with knobs at the upper end which provide for the securing of the sling, which is comprised of a pair of elastic tubes. Positioned within the middle of the elastic tubes is a leather missile engaging pocket. This is a standard slingshot construction which does not show any configuration similar to your concept using the natural properties of a bow construction.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the launching apparatus;
 FIG. 2 is a schematic diagram of the launching apparatus;
 FIG. 3 is an elevational view of the elastic band embodiments;
 FIG. 4 is an alternative embodiment of the launching apparatus;
 FIG. 5 is an alternative embodiment of the launching apparatus in a collapsed position;
 FIG. 6 is an elevational view of the bolt;
 FIG. 7 is an elevational front view of the bolt;
 FIG. 8 is an alternative embodiment elevational front view of the bolt;
 FIG. 9 is a detail elevational view of the bolt head embodiments;
 FIG. 10 is a perspective view of a user holding the bolts in a rapid-fire arrangement;
 FIG. 11 is a detail elevational view of a bolt target assembly;
 FIG. 12 is an elevational view of the bolt assemblies on user appendages.

DESCRIPTION OF THE EMBODIMENTS

Generally speaking, the present embodiment incorporates design and functions of a slingshot in combination with a bow-type construction and enables the user to provide

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sequential, rapid-fire shots of a plurality of existing bolts held by the user. The bolts are equipped with a series of firing hooks which are distributed about the outer face of the bolt and enable the user, while maintaining the bolts between the user's finger digits to fire the bolts quickly from between for example the index finger and the middle finger, the middle finger and the ring finger, or the ring finger and the small finger. With the combination of the quick launching firing bolts and the launching apparatus (to be described below), the user can rapidly fire at least three bolts in succession from the launching apparatus.

A discussion of the launching apparatus and its various characteristics and alternative embodiments will now be provided. A brief discussion of the structure and orientation of the launching apparatus will be provided. A discussion of the frame, the firing band, and the arm brace will be provided with varying embodiments. Further discussion of the arrangement of the launching apparatus to maintain a launching plane perpendicular to the forearm brace **34**, as seen in FIG. 1, will also be provided.

The current main embodiments of the launching apparatus include the arcuate frame **12** which is arranged within a launching plane defined by a longitudinal axis **14** and a transverse axis **16**. Perpendicular to this launching plane is the forearm brace **34** which in this particular embodiment includes an upper forearm member and a lower forearm member or section.

Referring to FIG. 1, the launching apparatus **10** has an arcuate frame **12** which is divided into a longitudinal medial section **20** located at the midpoint of the frame and transforms into a transversely aligned upper section **22** and a transversely aligned lower section **24** which both include or make up the top and bottom portions of the arcuate frame **12**.

The arcuate frame is constructed of in one embodiment, a wood material, but other types of materials can be used including a plastic-type material, metallic material, carbon fiber material, or other suitable alloys.

Within the launching plane, the arcuate frame **12** is arranged so that the elastic launching band **20** is displaced a transverse distance **52** as seen in FIG. 2, so that the launching of the bolt **40** is substantially unimpeded by the frame **12** as well as having the user's forearm **36** being positioned to the transverse side of the launching plane to avoid potential injury.

Extending laterally from the longitudinal medial section **20** and the longitudinal axis **14**, is a forearm brace **34** which runs parallel to the user's forearm **36**. The user's forearm **36** is arranged about a forearm central axis **18**. The forearm and hand **35** hold onto the launching apparatus **10** at the grip location **26** configured to accept the user's hand **35**.

A discussion of the forces acting on the launching apparatus will now be provided. In the present embodiment as seen in FIG. 1 as well as FIG. 2, the arcuate frame **12** is held within the launching plane at a right angle **38** perpendicular to the forearm central axis **18**. The forearm brace **34** provides leveraging resistance for the arcuate frame **12** during launch of the bolt **40** as further discussed below. Referring to FIG. 2, the user grips the launching apparatus **10** at the grip location **26** and the second hand of the user is used to hold the bolt **40** and provide a launching force **54** where the user by attaching the bolt **40** to the elastic launching band **28** at the intermediate catch portion **42** of the launching band applies the launching force **54** against the band **28**. The intermediate catch **42** is the location where the bolt **40** (discussed in more detail below) hooks onto the elastic launching band **28** for releasable firing.

The launching force **54** applied by the user will reach the maximum elastic band capacity **56** if the user pulls the bolt **40**

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along with the hooked elastic band **28** to its nearly inelastic capacity, thus providing a maximum elastic band launching force **54**.

As indicated above, the elastic band **28** is located a transverse launching distance **52** away from the longitudinal axis **14** of the main portion of the arcuate frame **12**. The launching force **54** combined with the transverse distance or launch moment arm **52** creates a launching moment (M) about the longitudinal axis **14** of the longitudinal medial section **20**.

To maintain the arcuate frame's planar orientation within the launching plane, the forearm brace **34** is rigidly connected to the longitudinal medial section **21** of the arcuate frame **12** as seen in FIG. 1-2. Rigid connection is provided either in a permanent type of connection or can be provided on a temporary type connection such as through the use of a quick release mechanism. In this current embodiment, clockwise positive moment about the longitudinal axis **14** is resisted by the forearm brace **34** because the forearm seat **44** rigidly attached at the unconnected end or distal end of the forearm brace **34** presses against the inside face **46** of the user's forearm **36** and resists the rotational launching moment arm provided by the launching force **54** in combination with the transverse distance **52**. A user thus can rely on a securely aligned plane and does not have to maintain the constant gripping force on the grip portion **26** of the longitudinal medial section **20**, thus giving the user a greater level of accuracy during firing.

The forearm brace has in the current embodiment (as seen in FIG. 1), the upper laterally aligned member **60** and the lower laterally aligned member **62**, which run parallel with the user's forearm central axis **18**. The forearm brace **34** must be held in place along a longitudinal axis **14** by leveraging against the inside face of the user's arm **46**. To accomplish this leverage resistance a forearm seat **44** is provided which in one embodiment can be a rigid type of semi-cylindrical plastic construction arranged to fit into the outside circumferential face of the user's forearm or it can be a soft pliable type of material such as a fabric or foam pad-type material.

The longitudinal transverse plane or in other words the launching plane, held at a predetermined launching angle **38** to the forearm central axis **18**, can be adjusted to additional launching plane angles to the forearm central axis **18** by an adjustment coupling mechanism about the longitudinal medial section **20** at the intersection of the forearm brace **34** with the longitudinal medial section **20**.

Depending on the distance desired for launching as well as the force desired for impact of the bolt against the target, the elastic launching band, as seen in FIG. 1, can be provided in varying embodiments to be utilized for launching the bolt **40**.

Referring to FIG. 3, the arcuate frame **12** is shown with currently **4** embodiments for the launching band. The first embodiment as seen previously in FIG. 1 is essentially an elastic band **28** which is constructed of a rubber-type material and is stretched taut between the upper connector **30** and the lower connector **32** leaving enough elastic spring capacity for the pullback of the bolts **40** during the launching from the intermediate catch location **42**. As seen in FIG. 3, the elastic band embodiments **70** further include a three part band assembly **72**, which has a first elastic band **78** and a second elastic band **80**, both connected respectively to the upper and lower connectors of the arcuate frame **12**. The first band **78** and the second band **80** connect to the inelastic hook catch **72**. The inelastic hook catch **72** can be, for example, a piece of rope or other type of fiber material which has flexible capacity to bend but which has little or no elasticity.

A third embodiment of the band is a five-part band **74** which has a first inelastic elastic band member connected to

the upper connector **30** and a second inelastic band member **88** which connects to the lower connector **32**. A first elastic band member **84** and a second elastic band member **82** both provide the spring launching force **54** for the firing of the bolts **40**. In this particular embodiment the first band member **84** and the second band member **82** are constructed of surgical tubing provided in varying diameters for increased or decreased launch capacity.

A fourth alternative embodiment provided is a seven-part launching band **76** which utilizes coiled springs for the launching force **54** (FIG. 2). A first coiled spring **98** and a second coiled spring **104** provided. Attached between the upper connector **30** and the first coiled spring **98** is an inelastic connector **96** which in this particular embodiment can be a rope-type of material. In between the lower portion of the first coiled spring **98** and the intermediate tapered catch portion **94** of this particular embodiment, is a second inelastic band connector **100**. Likewise, the lower portion of the seven-part band includes a first lower inelastic band **106** which connects the second coiled spring **104** to the lower connector **32**. The coiled spring **104** also has a second lower inelastic band **102** which connects the coiled spring to the intermediate tapered catch portion **94**.

This intermediate tapered catch portion **94** is essentially a V-shaped tapered section with an upper tapered member **106** and a lower tapered member **108** both designed to provide guidance of the firing hooks on the bolts towards the center point or medial location of the elastic band for an even faster alignment of the bolt hook into the proper firing hook location or "sweet spot" to increase accuracy and distance by providing the proper proportional launching alignment between the upper launching band portion **110** and the lower launching band portion **112**.

While the present band embodiments are provided, other bands can easily be conceived of and provided for providing the elasticity and spring launching force **54** required to meet the user's desired launching and distance requirements.

Many times the user will be traveling, and require a unit to be collapsible and compact. Referring to FIG. 4, an alternative embodiment is provided which is configured to collapse into a compact traveling type design and can then easily be erected into the launching apparatus for use at the various sporting events, hunting or as also conceived, for use as a child's toy.

Also, the forearm **34** is provided in an alternative embodiment as a single laterally aligned forearm member **60** having a forearm seat **44** cantilevering from the distal end **47** of the upper laterally aligned forearm member **60** in this embodiment. The forearm seat **44** is also provided in collapsible type arrangement so the seat and arm can be compacted with the rest of the apparatus. This particular embodiment includes a seat hinge **128** aligned laterally and parallel with the upper forearm member **60**.

The collapsible launching apparatus arms including the transverse upper section **22** and the transversely aligned lower section **24** fold over the longitudinal medial section **20** and the gripping portion **26** by pivoting about their respective hinges, including the upper frame hinge **124**, and the lower frame hinge **126**. The forearm **34** folds against the grip **26** by the release of the longitudinal medial forearm hinge **122**, attached to the longitudinal medial connection end **45** of the forearm **34** at the upper location of the longitudinal medial section **20**.

Because the three-part band **72**, in this particular embodiment, has essentially no compressive capacity, after the launching apparatus **120** is collapsed, the band can be wrapped around the collapsed unit and stored for later use.

Referring to FIG. 5, a discussion of the collapsible launching apparatus **120** will now be provided. While the present embodiment of the collapsible launching apparatus **120** has the transversely aligned upper section **22** and the transversely aligned lower section **24** folding about the longitudinal axis along the grip portion **26**, other types of folding arrangements can be utilized and are readily conceived of. For example, folding the entire launching apparatus **120** about a hinge located at the midpoint (not shown) of the longitudinal medial portion or section **120**. Nonetheless, in this particular embodiment, the collapsible launching apparatus **120** is arranged so that the transversely aligned upper section **22** and the transversely aligned lower section **24** can be folded along the longitudinal axis and against the grip portion **26**. The transversely aligned upper section **22** folds against the grip portion **26** by folding or articulating about the upper frame hinge **124**. Similarly, the transversely aligned lower section **24** folds and/or articulates about the lower frame hinge **126** against the longitudinally aligned medial section **20**. The forearm **34** collapses in towards the longitudinal section **20** and aligns itself with the main portion of the medial section **20** or in other words the grip portion **26**, and articulates about a laterally aligned seat hinge **128**. After collapsing the launching apparatus **120** to its collapsed position, the launching apparatus can be stored in a traveling case for shipping.

Discussion will now be provided on the second portion of the overall assembly, the configuration of the bolt for rapid-fire launch. The bolts themselves are configured so that they can be rapidly launched from the elastic launching band **28** while being maintained in between the user's finger digits.

Referring first to FIG. 10, the bolts are held in a user's hand **252** and can be placed between the user's fingers for rapid fire bolt launching **250**. One particular embodiment allows the bolts **40** to be arranged so that they can be easily drawn in succession against the elastic band **28** (FIG. 1).

For example, a first bolt **264** can be held between the index finger **256** of the user and the middle finger **258** of the user. A second bolt **266** can be held between the middle finger **258** of the user and the ring finger **260** of the user. Lastly a third bolt **268** can be held between the ring finger **260** of the user and the small finger **262** of the user. The bolts themselves can thus be held between these user fingers and the user can draw the first bolt **264** against the elastic launching band **28** as seen in FIG. 1, and apply the launching force **54** as seen in FIG. 2, to launch the first bolt.

Immediately after the first bolt has been launched, the user can align the second bolt **266** while it is still maintained between the middle finger and the ring finger in its current position, and launch the second bolt **266** by aligning the bolt firing hook to be discussed below, with the elastic bands **28**, and applying a backwards or launching force **54** (FIG. 2) against the elastic launching band **28**.

Lastly the user after firing the first bolt **264** and the second bolt **266** will still have the third bolt **268** maintained between the ring finger **260** and the small finger **262**. The user can align and attach the third bolt **268**, which will be discussed below, against the elastic band **28** (FIG. 1), and apply the launching force **54** (FIG. 2) to shoot the third successive bolt.

Referring now to and FIGS. 6-9, a detailed discussion of the bolt construction and alternative embodiments will be provided.

In the present embodiment, the bolt **40** as seen in FIG. 6, is currently provided as a cylindrical shaft, with a fore end **152** located at the front end in which the direction of the bolt will be fired, and an aft end **154** which is located at the rear of the cylindrically aligned lined shaft. The cylindrical aligned shaft **150** is arranged about shaft axis **166**.

At the aft end **154** of the bolt **40**, are positioned a number of fins **158** which provide for aerodynamic alignment of the bolt during the flight and also provide for a measure of grip between the user's fingers during the launching of the bolt.

In the particular embodiment being discussed, as seen in FIG. **6**, the bolts currently have four fins **158** which are extending radially from the shaft axis **166** and the fins **158** are spaced circumferentially equidistant apart from one another about the cylindrical shaft, as can be seen in FIG. **7**, the four fin, three hook arrangement **168**.

Alternatively, the bolts can have a three-fin arrangement and three-hook arrangement **170**, as seen in FIG. **8**, where in this particular embodiment the fins **158** are arranged in radial alignment with the hooks themselves **164**, thus providing for a more uniform construction process.

Back to the first embodiment, as seen FIGS. **6-7**, the fore end **152** has a number of firing hooks **164** which extend radially outwards from the shaft axis **166** and have an equidistant spacing about the shaft axis where the firing hooks **164** are arranged to face towards the aft portion of the bolt **40** which face towards the aft portion of the bolt **40**. While the present embodiment is provided with three radially extending and aft facing firing hooks **164**, a number of other firing hooks can be provided. For example, two firing hooks, one firing hook, four firing hooks, five firing hooks, or whichever number of firing hooks are adequate to provide for a reasonable measure of certainty to adequately catch the elastic launching band **28** (FIG. **1**) at the intermediate catch location **42** as seen in FIG. **1**. The firing hooks similar to the fins **158** are spaced circumferentially equidistant from one another about the cylindrical shaft **150**. One way of connecting the firing hooks to the cylindrical shaft **150** is through the use of a connecting ring which has a slightly smaller diameter than the outer diameter of the cylindrical shaft **156**. The shaft outer diameter **156** ranges from a maximum of approximately $1\frac{1}{2}$ inches to at least a minimum of approximately $\frac{1}{8}$ inch.

Along the same lines, the shaft length **160** ranges from approximately a maximum of 6 inches in length to a minimum of approximately 1 inch in length depending on the desired use and configuration of the bolt **40** for its particular sporting events. Along these lines, the bolts can be used for various types of sporting events including hunting, target practice, children's toys, as well as other types of uses such as for use within a movie as a prop.

With these various uses in mind, a brief discussion of the materials will be provided for the particular bolt configurations and/or uses. The bolt can be constructed of, for example, foam plastic which would lend itself towards a toy-like design. This toy-like design would be along the same lines of Nerf™-type toys where the primary user would be a child and/or young adult. The bolts themselves would have firing hooks which extend as previously mentioned radially from the fore end of the bolt head, and the firing hooks would have a yield which would enable them to only maintain a certain launching force **54**, and if the launching force exceeded the minimum yield of the firing hook, then the firing hook would bend and break thus acting as a safety measure and preventing the firing hooks from being launched at a higher velocity and higher force rate.

Along these lines of the children's toys, the bolts can be constructed of puffed rice or other types of biodegradable materials such as pasta and/or a glutinous-type gelatin material which is more commonly referred to as seen in the Gummi Bear-type candy on the market.

In addition to the biodegradable type material as well as the toy plastic foam type material, other materials can be used to construct the bolts. These include wood type materials, metal-

lic materials, PVC tubing type materials, fiberglass, or even a carbon fiber type construction. The above mentioned materials would be used more in the lines of hunting, sporting, and/or in the use of adult type sport designs.

To provide for the various types of uses that the bolts can be designed for, the bolt head **162**, as seen in FIG. **9**, is provided in an interchangeable type configuration for the various uses.

The bolt head **162** located at the extreme forward most end of the cylindrical shaft **150** can be either a permanent type connection to the cylindrical shaft **150** or can be a removable type of construction.

As seen in FIG. **6**, the bolt head **162** is a shortened cylindrical shaft-type arrangement, having a larger diameter than the cylindrical shaft **150** of the bolt itself. The bolt head is also provided in different arrangements and different connection type configurations to attach to the shaft **150**. As seen in FIG. **9**, the cylindrical shaft **150** at the fore end **152** has a threaded receiver portion **180** with an inside volume of the cylindrical shaft **150** having threaded grooves in the shaft itself to accept a threaded head **182**. At the fore end of the threaded head **182** is a Velcro™ head **184** which is configured in a cylindrical shape and has Velcro™ on the top front surface of the head. In this particular embodiment the attachment means is the hook portion of the "hook and loop"-type connector system generally referred to as Velcro™.

In addition to the cylindrical head, a spherical sponge type head **186** is shown attached to the threaded head portion **182**. In the sponge foam head type configuration, the spherical sponges can be soaked with a marker-type liquid paint, and the bolt **40** can be fired at opposing individuals and the paint soaked into the sponge head **186** will then splatter on the person which is hit or the target, thus indicating a strike or a direct hit. Next, the bolt head **162** can be provided as a conical arrow-type shape **188** connected to the top portion of the threaded head **182**. The conical arrow-type shape can be constructed of a metallic alloy or wood type of material and can be used for either hunting or sport target practice.

In addition to the previously mentioned head embodiments, a magnetic detachable head marker **190** is provided to be attached to the threaded head portion **182**. At the outer surface of the detachable head marker **190**, a hook-type fastener **191** for interface with the loop-type fastener, say for example, on a target as seen in FIG. **11**. When the bolt **40** is shot from the launching apparatus **10**, the bolt head **162** can impact a target **204**, where the negative magnetic head **194** may adhere to the receiving portion of the Velcro™ type connection apparatus, and the positive magnetic head portion **192**, which is permanently attached to the target bolt **202**, due to the bolt dead load, will pull away from the negative bolt portion **202**. The magnetic head portion **194** adhering to the particular circular scoring zone **206** of the target **204** as seen for target practice of the dart/bolt **202** to in the bolt target assembly **200** will indicate a score.

Due to the rapid-fire nature of this entire assembly, multiple bolts must be readily accessible for use during a shooting match through the use of a bolt holster or bolt assembly apparatus **220**, as seen in FIG. **12**. The bolt assembly **220** provides the user with different embodiments or arrangements for carrying the bolts **40** on various appendages and/or about the waist of the user. For example, an arm bolt assembly **226** is provided where the bolts **40** are attached to an armband which in one form might be spandex type material, in another form might be a cloth with a Velcro™ type fastener, and the bolts are attached to the armband through the use of bolt holders or bolt clips **228**. This bolt clip can be a clip type double arm fastener arrangement or they can be a connector type arrangement where the bolt itself has a Velcro™ hook

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fastener and the band has a Velcro™ loop fastener so that the bolts can be attached. Furthermore, the connector portion is also designed to be provided by a plurality of loops which might be attached to the outer face of the armband. Similar to the armband, a leg band assembly 222 can be provided for additional storage of the plurality of bolts 40. Lastly, a belt bolt assembly 224 is provided where the bolts sit within a pocket of the belt bolt pouch and the pouch itself is connected to the belt of the user through the use of loop-type connectors.

I claim:

1. A rapid fire launching apparatus comprising:

a. an arcuate frame comprising a longitudinal medial section, a transversely aligned upper section, and a transversely aligned lower section;

b. said longitudinal medial section further comprising a grip portion substantially bisecting said longitudinal medial section;

c. said arcuate frame further comprising an elastic launching band held taut between an upper connector extending from said transversely aligned upper section and a lower connector extending from said transversely aligned lower section;

d. said longitudinal medial section further comprising a forearm brace extending parallel to a forearm central axis of a user, said forearm brace configured to maintain a launching plane between said arcuate frame and said user's forearm by resisting a moment about said longitudinal medial section of said arcuate frame due to an elastic band launching force exercised on said arcuate frame during rapid fire launch; of a bolt from said elastic band;

e. said bolt comprising: a longitudinally aligned cylindrical shaft having a fore-end and an aft-end; said fore-end further comprising a head portion at the forward most portion of said fore-end, a first firing hook extending radially and facing aft, a second firing hook extending radially and facing aft, said first firing hook and said second firing hook spaced circumferentially equidistant from each other about said cylindrical shaft and positioned to facilitate rapid fire of said bolt from said elastic band;

f. said aft-end of said bolt further comprising a first fin radially extending from said cylindrical shaft, a second fin radially extending from said cylindrical shaft, a third fin radially extending from said cylindrical shaft, said first fin, second fin and third fin each spaced circumferentially equidistant apart from the other about said cylindrical shaft, said fins configured to provide aero-dynamic alignment during flight and grip for user's fingers during launch;

g. said elastic band further comprises an upper elastic band portion, a lower elastic band portion and an intermediate catch portion arranged between said upper elastic band portion and said lower elastic band portion, said intermediate catch portion substantially non-elastic.

2. A rapid fire launching apparatus comprising:

a. an arcuate frame comprising a longitudinal medial section, a transversely aligned upper section, and a transversely aligned lower section;

b. said longitudinal medial section further comprising a grip portion substantially bisecting said longitudinal medial section;

c. said arcuate frame further comprising an elastic launching band held taut between an upper connector extending from said transversely aligned upper section and a lower connector extending from said transversely aligned lower section;

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d. said longitudinal medial section further comprising a forearm brace extending parallel to a forearm central axis of a user, said forearm brace configured to maintain a launching plane between said arcuate frame and said user's forearm by resisting a moment about said longitudinal medial section of said arcuate frame due to an elastic band launching force exercised on said arcuate frame during rapid fire launch; of a bolt from said elastic band;

e. said bolt comprising: a longitudinally aligned cylindrical shaft having a fore-end and an aft-end; said fore-end further comprising a head portion at the forward most portion of said fore-end, a first firing hook extending radially and facing aft, a second firing hook extending radially and facing aft, said first firing hook and said second firing hook spaced circumferentially equidistant from each other about said cylindrical shaft and positioned to facilitate rapid fire of said bolt from said elastic band;

f. said aft-end of said bolt further comprising a first fin radially extending from said cylindrical shaft, a second fin radially extending from said cylindrical shaft, a third fin radially extending from said cylindrical shaft, said first fin, second fin and third fin each spaced circumferentially equidistant apart from the other about said cylindrical shaft, said fins configured to provide aero-dynamic alignment during flight and grip for user's fingers during launch;

g. said forearm brace further comprises a first upper laterally aligned member, a second lower laterally aligned member, said upper laterally aligned member connected rigidly to a top end of said gripping portion, said second lower laterally aligned member connected rigidly to a bottom end of said gripping portion at the longitudinally aligned lower location, a semicircular forearm seat connecting said first upper laterally aligned member to said second lower laterally aligned member, said semicircular forearm seat configured to provide leverage stability against said forearm by resisting said launching moment arm about said longitudinal medial section due to said maximum elastic band force.

3. The rapid fire launching apparatus according to claim 2 wherein said arcuate frame further comprises: a plastic material, a metallic material, a carbon fiber material, or a wooden material.

4. The rapid fire launching apparatus according to claim 2 wherein said forearm brace further comprises a plastic material, wooden material, metallic material, a carbon fiber material.

5. The rapid fire launching apparatus according to claim 2 wherein said bolt further comprises a third firing hook extending radially and facing aft, said first firing hook, said second firing hook, and said third firing hook circumferentially spaced equidistant from one another about said cylindrical shaft.

6. The rapid fire launching apparatus according to claim 2 wherein said bolt further comprises a fourth fin radially extending from said cylindrical shaft, said first fin, said second fin, said third fin, and said fourth fin spaced circumferentially equidistant apart from each other about said cylindrical shaft.

7. The rapid fire launching apparatus according to claim 2 wherein said bolt further comprises a foam/plastic material for child safe toys.

8. The rapid fire launching apparatus according to claim 2 wherein said bolt further comprises one or more of the following materials: wood, metal, PVC, fiberglass, carbon fiber.

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9. The rapid fire launching apparatus according to claim 2 wherein said bolt further comprises a longitudinally aligned length of about 6 inches or less.

10. The rapid fire launching apparatus according to claim 2 wherein said head portion is further configured to be removed from said fore end and replaced with a replacement head.

11. The rapid fire launching apparatus according to claim 2 wherein said head portion further comprises a target locking mechanism for attachment to a surface of a target, upon impact of said target locking mechanism against said target surface.

12. The rapid fire launching apparatus according to claim 11 wherein said target locking mechanism comprises either a hook or a loop type fastener to engage with said target surface comprising either a hook or a loop type receiver for attachment with said target locking mechanism.

13. The rapid fire launching apparatus according to claim 11 wherein said bolt head is further comprised to detach from said fore end upon impact of said target surface.

14. The rapid fire launching apparatus according to claim 2 wherein said cylindrical shaft further comprises a shaft diameter of about 1½ inches or less.

15. The rapid fire launching apparatus according to claim 2, wherein said apparatus further comprises: a bolt holster comprising a plurality of quick release bolt holders, said quick release bolt holders configured to maintain a plurality of bolts on said bolt holster and allow a user to easily grab said bolt and detach said bolt from said bolt holster.

16. The rapid fire launching apparatus according to claim 2 wherein said elastic launching band further comprises a bolt catch location configured to accept a bolt for rapid-fire launch.

17. The rapid fire launching apparatus according to claim 2 wherein said elastic band further comprises a surgical tubing material.

18. A rapid fire launching apparatus comprising:

- a. an arcuate frame comprising a longitudinal medial section, a transversely aligned upper section, and a transversely aligned lower section;
- b. said longitudinal medial section further comprising a grip portion substantially bisecting said longitudinal medial section;
- c. said arcuate frame further comprising an elastic launching band held taut between an upper connector extending from said transversely aligned upper section and a lower connector extending from said transversely aligned lower section;
- d. said longitudinal medial section further comprising a forearm brace extending parallel to a forearm central axis of a user, said forearm brace configured to maintain a launching plane between said arcuate frame and said user's forearm by resisting a moment about said longitudinal medial section of said arcuate frame due to an elastic band launching force exercised on said arcuate frame during rapid fire launch; of a bolt from said elastic band;
- e. said bolt comprising: a longitudinally aligned cylindrical shaft having a fore-end and an aft-end; said fore-end further comprising a head portion at the forward most portion of said fore-end, a first firing hook extending radially and facing aft, a second firing hook extending radially and facing aft, said first firing hook and said second firing hook spaced circumferentially equidistant from each other about said cylindrical shaft and positioned to facilitate rapid fire of said bolt from said elastic band;

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f. said aft-end of said bolt further comprising a first fin radially extending from said cylindrical shaft, a second fin radially extending from said cylindrical shaft, a third fin radially extending from said cylindrical shaft, said first fin, second fin and third fin each spaced circumferentially equidistant apart from the other about said cylindrical shaft, said fins configured to provide aero-dynamic alignment during flight and grip for user's fingers during launch;

g. said forearm brace further comprises a first upper laterally aligned member rigidly connected to said longitudinal medial section near said gripping location, said first upper laterally aligned member extending parallel to said forearm central axis, said laterally aligned member having a longitudinal medial connection end and a distal end, a semicircular forearm seat extending from said distal end of said laterally aligned member to provide leverage stability against said forearm by resisting said launching moment arm about said longitudinal medial section due to said maximum elastic band force.

19. A rapid fire launching apparatus comprising:

- a. an arcuate frame comprising a longitudinal medial section, a transversely aligned upper section, and a transversely aligned lower section;
- b. said longitudinal medial section further comprising a grip portion substantially bisecting said longitudinal medial section;
- c. said arcuate frame further comprising an elastic launching band held taut between an upper connector extending from said transversely aligned upper section and a lower connector extending from said transversely aligned lower section;
- d. said longitudinal medial section further comprising a forearm brace extending parallel to a forearm central axis of a user, said forearm brace configured to maintain a launching plane between said arcuate frame and said user's forearm by resisting a moment about said longitudinal medial section of said arcuate frame due to an elastic band launching force exercised on said arcuate frame during rapid fire launch; of a bolt from said elastic band;
- e. said bolt comprising: a longitudinally aligned cylindrical shaft having a fore-end and an aft-end; said fore-end further comprising a head portion at the forward most portion of said fore-end, a first firing hook extending radially and facing aft, a second firing hook extending radially and facing aft, said first firing hook and said second firing hook spaced circumferentially equidistant from each other about said cylindrical shaft and positioned to facilitate rapid fire of said bolt from said elastic band;
- f. said aft-end of said bolt further comprising a first fin radially extending from said cylindrical shaft, a second fin radially extending from said cylindrical shaft, a third fin radially extending from said cylindrical shaft, said first fin, second fin and third fin each spaced circumferentially equidistant apart from the other about said cylindrical shaft, said fins configured to provide aero-dynamic alignment during flight and grip for user's fingers during launch;
- g. said bolt further comprising an edible material comprising one or more of the following ingredients: puffed rice, pasta, glucose and gelatin.